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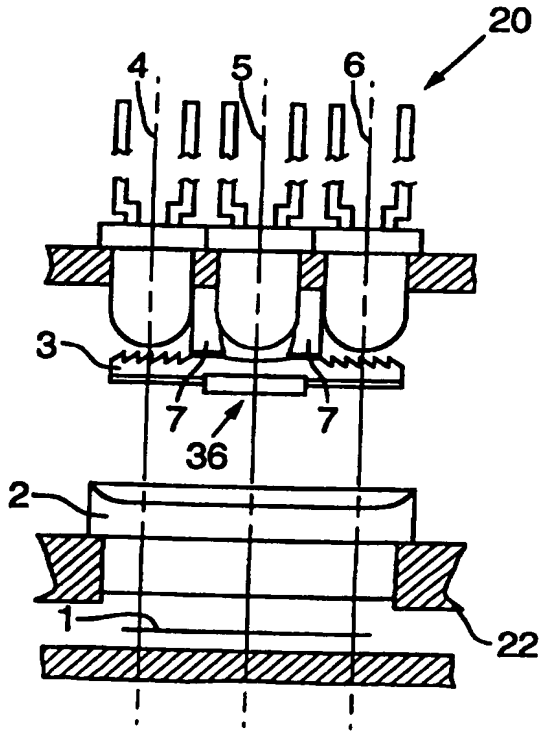
(54) Title: OPTICAL REFLECTION SENSING ARRANGEMENT FOR SCANNING DEVICES

(57) Abstract

The optical scanner uses a unique compound optical system for processing reflected radiation in a manner to reduce the variations caused by changing position of a scanned substrate in a guideway. Two sources of radiation are directed at similar angles to the surface to be screened and the radiation is distributed over a larger area. Changes in position of the substrate in the guideway change the actual area reflecting the radiation sensed by the sensor, but the size of the reflecting area does not appreciably change. Any change effects both radiation systems in a similar manner.



in a particular manner. Figure 6 clearly shows how the emitted radiation, generally shown as 26, strikes the series of angled surfaces, generally shown as 14, and cause deflection of the emitted radiation producing the distributed radiation field, generally shown as 28. This radiation field has radiation of a similar angle and has distributed the radiation in a particular manner to provide more even intensity distribution along the exposed portion of the substrate, generally indicated as 30.

A second lens, this being the thick cylindrical lens 2, receives this radiation and as shown as Figure 7, again focuses the band of radiation into an area of reduced width. This is generally shown at position 32 in Figure 7. The radiation emitted by the LED 4 is similarly treated, however, it is angled in the opposite direction, and thus, exposes a similar area 30 on the substrate. Thus, the radiation from each of the LED's has been distributed in a particular manner and has been focused to expose a band on the substrate to the radiation. The intensity of the radiation over the distributed area 30 is similar.

The complex optical lens 3 includes a center section, generally shown as 36, which receives the radiation reflected from the substrate. It receives radiation from the substrate of the wavelength of the radiation from the LED 4 as well as of the wavelength of the radiation from the LED 6. The reflected radiation is generally shown in Figures 4 and 5 where the reflected radiation, indicated as 42, is focused by lens 2 and is focused a second time by the optical component 37 provided in front of the photo sensor 5. This tends to concentrate the reflected radiation on the photo sensor and generally regroups the distributed radiation.

As can be appreciated, the position of the substrate 1 within the guideway 22 is subject to tolerance variations and this would normally lead to substantial changes in the intensity of the sensed radiation. In contrast to prior devices, the photo sensor 5 only views a limited portion of the band on the substrate and changes in

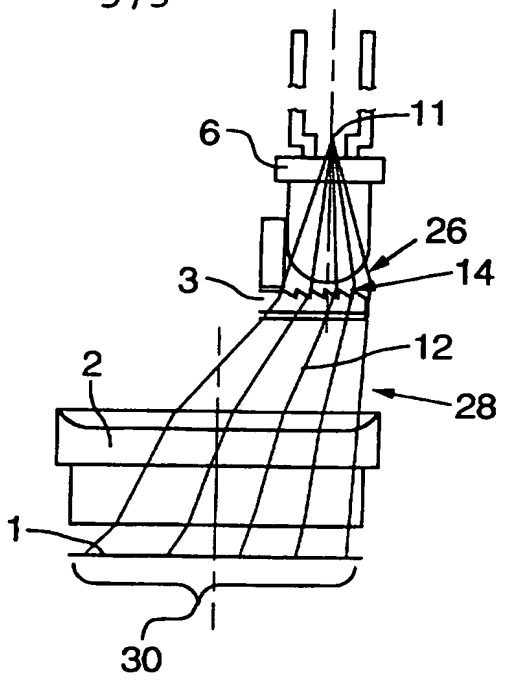


FIG.6

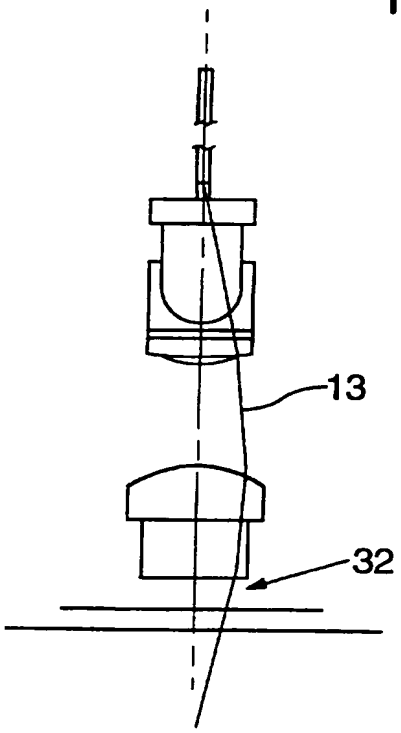


FIG.7

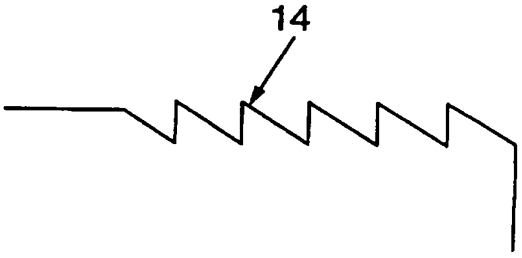


FIG.8